

FIG. 1

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LOS Locus

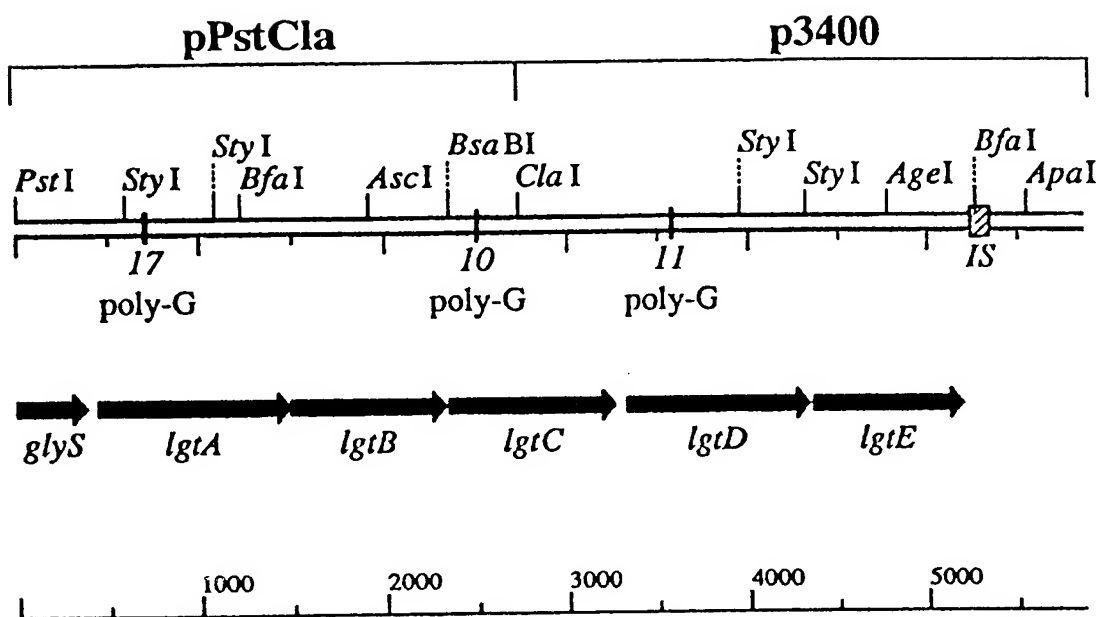


FIG.2A



1gtA	1	LQPLVSVLICAYNVEKYFAQSLAAVVNQ	TWRNLDILIVDDGSTDGTLAIA	50
1gtD	1	LQPLVSVLICAYNAEKYFAQSLAAVVGQ	TWRNLDILIVDDGSTDGTPAIA	50
1gtA	51	KDFQKRDSRIKILAAQAQNSGLIPSLNIGL	DELAKSGGGGEYIARTDADD	100
1gtD	51	RHFQEQDGRIRIISNPRNLGFIASLNIGL	DELAKS..GGGEYIARTDADD	98
1gtA	101	IASPGWIEKIVGEMEKDRSIIAMGAWLEVL	SEEKDGNRLARHHKHGKIWK	150
1gtD	99	IASPGWIEKIVGEMEKDRSIIAMGAWLEVL	SEENKSVLAAIARNGAIWD	148
1gtA	151	KPTRHEDIAAFFPFGNP	IHNNTMIMRRSVIDGGLRYDTERDWAEDYQFWY	200
1gtD	149	KPTRHEDIVAVFPFGNP	IHNNTMIMRRSVIDGGLRFPAYIHAEDYKFWY	198

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FIG. 3A



7gtA 201 DVSKLGRLAYYPEALVKYRLHANQVSSKHSVRQHEIAQGIQKTARNDFLQ 250

1gtD 199 EAGKLGRLAYYPEALVKYRFHQDQTSSKYNLQQRRTAWKIKEEIRAGYWK 248

1gtA 251 SMGFKTRFDSLEYRQTKAAAYELPEKDLPEEDFERARRFLYQCfKRTDTP 300

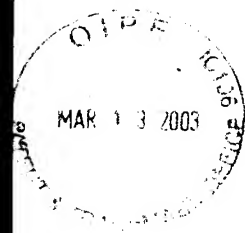
1gtD 249 AAGIavgadclnyglLKstAYALYEKALSGQDIGCLRLFLYEYFLSLEKY 298

7gtA 301 PSGAWLDFEAADGRMRRLLFTLRQYFGILYRLIKNRR 335

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐ 7. ☐ 8. ☐ 9. ☐ 10. ☐ 11. ☐ 12. ☐ 13. ☐ 14. ☐ 15. ☐ 16. ☐ 17. ☐ 18. ☐ 19. ☐ 20. ☐ 21. ☐ 22. ☐ 23. ☐ 24. ☐ 25. ☐ 26. ☐ 27. ☐ 28. ☐ 29. ☐ 30. ☐ 31. ☐ 32. ☐ 33. ☐ 34. ☐ 35. ☐ 36. ☐ 37. ☐ 38. ☐ 39. ☐ 40. ☐ 41. ☐ 42. ☐ 43. ☐ 44. ☐ 45. ☐ 46. ☐ 47. ☐ 48. ☐ 49. ☐ 50. ☐ 51. ☐ 52. ☐ 53. ☐ 54. ☐ 55. ☐ 56. ☐ 57. ☐ 58. ☐ 59. ☐ 60. ☐ 61. ☐ 62. ☐ 63. ☐ 64. ☐ 65. ☐ 66. ☐ 67. ☐ 68. ☐ 69. ☐ 70. ☐ 71. ☐ 72. ☐ 73. ☐ 74. ☐ 75. ☐ 76. ☐ 77. ☐ 78. ☐ 79. ☐ 80. ☐ 81. ☐ 82. ☐ 83. ☐ 84. ☐ 85. ☐ 86. ☐ 87. ☐ 88. ☐ 89. ☐ 90. ☐ 91. ☐ 92. ☐ 93. ☐ 94. ☐ 95. ☐ 96. ☐ 97. ☐ 98. ☐ 99. ☐ 100. ☐

1gtD 299 SLTDLLDFLTDRVMRKLF AAPQYRKILKKMLRPWK 333

FIG. 3B



1gtB 1 MQNHV ISLASAERRAHIADTFGSRGIPFQFFDALMPSERLEQAMAE LVP 50
|||||
1gtE 1 MQNHV ISLASAERRAHIADTFGSRGIPFQFFDALMPSERLEQAMAE LVP 50
|||||

1gtB 51 GLSAHLYLSGVEKACFMSHAWLWEQALDEGLPYIAVFEDDVL LGE GAEQF 100
|||||
1gtE 51 GLSAHPYLSGVEKACFMSHAWLWEQALDEGLPYIAVFEDDVL LGE GAEQF 100
|||||

1gtB 101 LAEDTWLQERFDPDSAFVVRLETMFMHVLTSPSGVADYGGRAFPL LESEH 150
|||||:|||||.|||||:|||||.|||||:|||||.|||||:|||||.|||||:|||||.|||||
1gtE 101 LAEDTWLEERFDKDSAFIVRLETMFAKIVIRPDKVLNYENRSFPL LESEH 150
|||||:|||||.|||||:|||||.|||||:|||||.|||||:|||||.|||||:|||||.|||||

1gtB 151 CGTAGYIISRKAMRFFLDRFAVLPPERLHPVDLMMFGNPDDREGMPVC QL 200
|||||:|||||.|||||:|||||.|||||:|||||.|||||:|||||.|||||:|||||.|||||
1gtE 151 CGTAGYIISRKAMRFFLDRFAVLPPERIKAVDLMMF TYFFDKEGMPVYQV 200
|||||:|||||.|||||:|||||.|||||:|||||.|||||:|||||.|||||:|||||.|||||

FIG.4A

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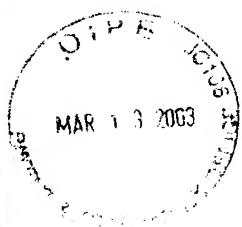
[illegible][illegible]

FIG. 4B

FIG. 5A

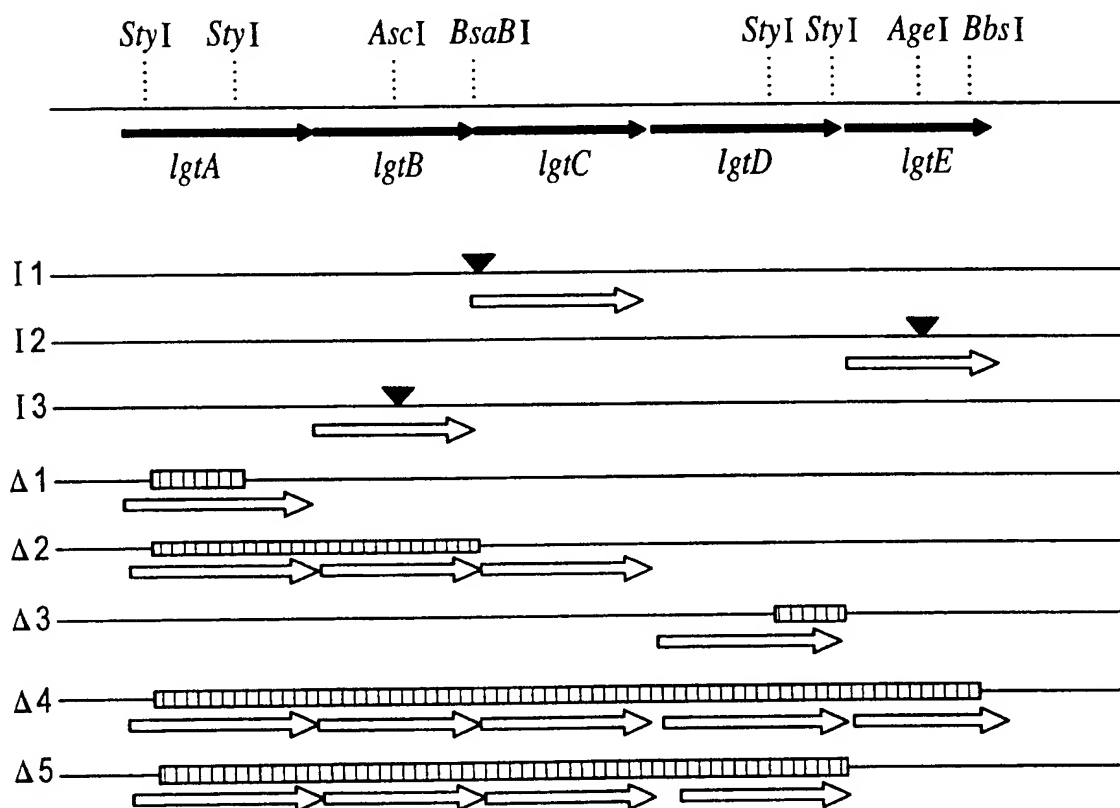


FIG. 5B



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FIG.6



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FIG. 7



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FIG. 8

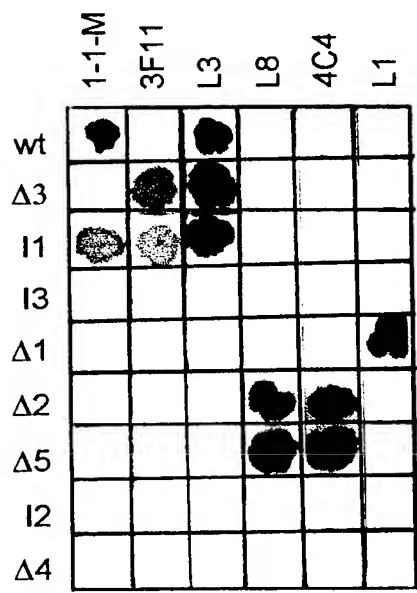


FIG.2B-1

SOURCE Neisseria gonorrhoeae.
ORGANISM Neisseria gonorrhoeae
source 1..5859

CDS
 <1..381
 /gene="glyS"
 /codon_start=1
 /transl_table=11
 /product="glycyl tRNA synthetase beta chain"

/translation="LQAVAVFKQLPEAAALAAANKRVQNLLKKADAALGEVNESLLQQ
DEEKALYAAAQGLQPKIAAAVAEGNFRALTSELASVKPQVDAFFDGMVMAEDA AAVKQ
NRLNLLNRLAEQMNVA DIALLGE"

CDS 445..1491
 /gene="lgtA"
 /codon_start=1
 /function="adds GlcNAc to lacto-N-neotetraose chain of
 gonococcal LOS"
 /evidence=experimental
 /transl_except=(pos:445..447,aa:Met)
 /transl_table=11
 /product="glycosyl transferase"

/translation="MQPLVSVLICAYNVEKYFAQSLAAVVNQWTRNLDILIVDDGSTD
GTLAI AKDFQKRDSRIKILAQANSGLIPSLNIGLDELAKSGGGGEYIARTDADDIA
SPGWIEKIVGEMEKDRSIIAMGAWLEVLSEKDGNRRLARHKKHKKIWKKPTRHEDIAA
FFPFGNPIHNNTMIMRRSVIDGGLRYDTERDWAEDYQFWYDVSKLGRLAYYPEALVKY
RLHANQVSSKHSVRQHEIAQGIQKTARNDLQSMGFKTRFDSLEYRQTKAAAYELPEK
DLPEEDFERARRFLYQCFKRRTDTPPSGAWLDFADGRMRRLFTLRQYFGILYRLIKNR
RQARSDSAGKEQEI"

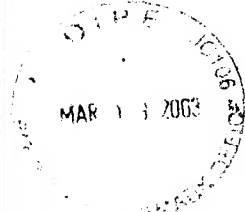




FIG.2B-2

CDS

```
1491..2330
/gene="lgtB"
/codon_start=1
/function="adds second galactose to the lacto-N-tetraose
chain in LOS"
/evidence=experimental
/product="glycosyl transferase"
```

```
/translation="MQNHVISLASAERRAHIAATFGSRGIPFQFFDALMPSERLERA
MAELVPGLSAHPYLSGVEKACFMHAVLWEQALDEGVPIAVFEDDVLGEGAEQFLA
EDTWLQERFDPDSAFVVRLETMFMHVLTSPSGVADYGGRAFPILLESEHCGTAGYIISR
KAMRFFLDRAVLPPERLHPVDLMMFGNPDDREGMPVCQLNPALCAQELHYAKFHDQN
SALGSLIEHRRRLNRKQQWRDSPANTFKHRLIRALTKIGRERKRRRREQLIKIIIV
PFQ"
```

CDS

```
2342..3262
/gene="lgtC"
/codon_start=1
/function="adds galactose alpha(1-4) to Gal-Glc in
gonococcal LOS"
/evidence=experimental
/transl_table=11
/product="glycosyl transferase"
```

```
/translation="MDIVFAADDNYAAYLCVAAKSVEAAHPDTEIRFHVLDAGISEEN
RAAVAANLRGGNIRFIDVNPEDFAGFPLNIRHISITTYARLKLGEYIADCCKVLYLD
TDVLVRDGLKPLWDTDLGGNWWGACIDLFVERQEGYKQKIGMADGEYFYNAGVLLINL
KKWRRHDI FKMSCEWVEQYKDVQYQDDQDILNGLFKGGVCYANSRNFNMPNTNYAFMAN
GFASRHTDPLYLDRNTAMPVAVSHYCGSAKPWHRDCTVWGAERFTELAGSLTTVPEE
WRGKLAVPPTKCMQLQRWRKKLSARFLRKIY"
```

CDS

3322..4335

```
/gene="lgtD"  
/codon_start=1  
/function="adds terminal GalNAc to lacto-N-neotetraose  
chain of LOS"  
/evidence=experimental  
/transl_except=(pos:3322..3324,aa:Met)  
/transl_table=11  
/product="glycosyl transferase"
```

FIG.2B-3

```
/translation="MQPLVSVLICAYNAEKYFAQSLAAVVGQTWRNLDILIVDDGSTD  
GTPAIAHFQEQQGRIRIISNPRNLGFIAISNLIGLDELAKSGGGEYIARTDADDDIASP  
GWIEKIVGEMEKDRSIIAMGAWLEVLSENNKSVLAAIARNGAIWDPKPTRHEDIVAVF  
PFGNPIHNNMTMIMRRSVIDGGLRFPAYIHAEDYKFWEAGKLGRLAYYPEALVKYRF  
HQDQTSSKYNLQQRRTAWKIKEIRAGYWKAAAGIAGADCLNYGLLKSTAYALYEKAL  
SGQDIGCLRFLYEYFLSLEKYSITDLDLFTDRVMRKLFAAPQYRKILKKMLRPWKY  
RSY"
```

CDS

4354..5196

```
/gene="lgtE"  
/codon_start=1  
/function="adds first galactose to lacto-N-neotetraose  
chain of LOS"  
/evidence=experimental  
/transl_table=11  
/product="glycosyl transferase"
```

```
/translation="MQNHVISLASAERRAHIADTFGSRGIPQFFDALMPSELEQA  
MAELVPGLSAHPYLSGVEKACFMSHAVLWEQALDEGLPYIAVFEDDVLLGEGAEQFLA  
EDTWLEERFDKDSAFIVRLETMTFAKVIVRPDKVLNYENRSFPLLESEHCGTAGYIISR  
EAMRFFLDRFAVLPPERIKAVDLMFTYFFDKEGMPYQVSPALCTQELHYAKFLSQN  
SMLGSDLEKDREQRRHRRSLKVMFDLKRALGKFGREKKRMRERQQAELKVKYGRRV  
ILFK"
```



FIG.2B-4

BASE COUNT 1412 a 1462 c 1661 g 1324 t

ORIGIN

1 ctgcaggccg tcgccgtatt caaacaactg cccgaagccg ccgcgctcgc cgccgccaac
61 aaacgcgtgc aaaaacctgt gaaaaaagcc gatgccgcgt tggcggaagt caatgaaagc
121 ctgctgcaac aggacgaaga aaaagccctg tacgctgccg cgaaaggttt gcagccgaaa
181 attgccgccg ccgtcgccga aggcaatttc cgaaccgcct tgtccgaact ggcttccgtc
241 aagccgcagg ttgatgcctt cttcgacggc gtgatggtga tggcgggaaga tgccgccgta
301 aaacaaaacc gcctgaacct gctgaaccgc ttggcagagc agatgaacgc ggtggccgac
361 atcgcgcttt tggcgagta accgttgtac agtccaaatg ccgtctgaag cttcaggcg
421 gcatcaaat atcgggagag taaattgcag cctttagtca gcgtattgat ttgcgcctac
481 aacgtagaaa aatattttgc ccaatcatta gccgccgtcg tgaatcagac ttggcgcaac
541 ttggatatth tgattgtcga tgacggctcg acagacggca cacttgccat tgccaaggat
601 ttctaaaaagc gggacagccg tatcaaaatc cttgcacaa gggggggggg cgccctgatt
661 ccctctttaa acatcgggct ggacgaattg gcaaaagtcgg gggggggggg gggggaatat
721 attgcgcgca ccgatgccga cgatatggcc tccccggct ggattgagaa aatcgtgggc
781 gagatggaaa aagaccgcag catcattgcy atgggcgcgt ggctggaaagt ttgtcggaa
841 gaaaaggacg gcaaccggct ggcgcggcac cacaacacag gcaaaatttg gaaaaagccg
901 acccggcacg aagacatcgc cgccttttc cctttcggca acccataka caacaacacg
961 atgattatgc ggcgcagcgt cattgacggc ggtttgcgtt acgacaccca gcgggattgg
1021 gcggaagatt accaatthtg gtacgatgtc agcaaatthg gcaggctggc ttattatccc
1081 gaagccttgg tcaaataccg ccttcacgcc aatcaggtht catccaaaca cagcgtccgc
1141 caacacgaaa tcgcgcaagg catccaaaa accgccagaa acgatttttt gcagtctatg
1201 ggttttaaaa cccggttcga cagcctagaa taccgcaaaa caaaagcagc ggcgtatgaa
1261 ctgccggaga aggatttgcc ggaagaagat ttgaaacgcg ccgcgcggtt ttgtaccaaa
1321 tgcttcaaac ggacggacac gcccccctcc ggcgcgtggc tggatttcgc ggcagacggc
1381 aggatgaggg ggctgtttac cttgaggcaa tacttcggca ttttgtaccg gctgattaaa
1441 aaccgccggc aggcgcggtc ggattcggca ggaagaagac aggagattta atgcaaaacc
1501 acgttatcag cttggcttcc gcccgagaac gcaggggcga cattgccga accttcggca
1561 gtcgcggcat cccgttccag tttttcgac cactgatgcc gtctgaaagg ctggaacggg



FIG.2B-5

1621 caatggcggg actcgtcccc ggcttgtcgg cgcaccccta tttgagcggg gtggaaaaag
1681 cctgctttat gagccacgcc gtatttgtgg aacaggcatt ggacgaaggc gtaccgtata
1741 tcgccgtatt tgaagatgat gtcttactcg gcgaaggcgc ggagcagttc cttgccgaag
1801 atacttggct gcaagaacgc tttgaccccg atccgcctt tgcgtccgc ttggaacga
1861 tgtttatgca cgtcctgacc tcgccctccg gcgtggcggg ctacggcggg cgcgcctttc
1921 cgcttttggg aagcgaacac tgcgggacgg cgggctatat tattcccg aagcgatgc
1981 gttttttctt ggacaggttt gccgttttgc cgcggaaag cctgcacctt gtcgatttga
2041 tgatgttcgg caaccctgac gacagggaag gaatgccggt ttgccagtc aatccgcct
2101 tgtgcgccc agagctgcat tatgccaaat ttcacgacca aacagcgcga ttgggcagcc
2161 tgatcgaaca tgaccgccgc ctgaaccgca aacagcaatg gcgcgattcc ccgccaaca
2221 cattcaaaa ccgcctgac cgcgccttga ccaaatcgg cagggaagg gaaaaacgcc
2281 ggcaaaagcg cgaacagtta atcggcaaga ttatttgtcc ttccaataa aaggagaaaa
2341 gatggacac gtatttgccg cagacgacaa ctatgccgc tacctttgcg ttgcggcaaa
2401 aagcgtggaa gcggcccatc ccgatacggg aatcagggtc cagtcctcg atgccggcat
2461 cagtagggaa aaccgggccc cggttgccgc caatttgccg ggggggggta atatccgctt
2521 tatagacgta aaccccgagg atttcgcccg atacattgcc gattgcgaca aagtcctgta
2581 tacgacttat gccgcctga aattggcgga cctgaagccc ttatgggata cggatttggg
2641 tctggatacg gacgtatttg tcagggacgg gtttgtcgaa aggcagggaag gatacaaa
2701 cggtaactgg gtcggcgcgt gcatacattt tttcaatgcc ggcgtattgc tgatcaacct
2761 aaaaatcgg atggcgagc gagaatatta aatgtcctgc gaatgggtgg aacaatacaa
2821 gaaaagtgg cggcggcacg atattttcaa tttgaacggg ctgttttaag gcgggggtgtg
2881 ggacgtgatg caatatcagg atcaggacat tttgaacggg gactgtatgg cgaacgggtt
2941 ttatgcgaac agccgtttca actttatgcc gaccgtacc aatacggcga tgcccgtcgc
3001 tgcgtcccgc cataccgacc cgtttacct gtggcacagg gactgcaccg tttgggtgc
3061 cgtcagccat tattgcggct cggcaagcc cgcgacggtt ccgaaagaat ggcgcgccaa
3121 ggaacgtttc acagagtgg ccggcagcct gacgacggtt tcaagatgg cgcaaaaagc tgtctgccag
3181 acttgccgtc ccgccgacaa agtgtagct tcaagatgg gccgtctgaa gccttcagac ggcatcggac
3241 attcttacgc aagatttatt gacggggcag gccgtctgaa gccttcagac ggcatcggac
3301 gtatcggaaa ggagaaacgg attgcagcct ttagtcagcg tattgattg cgcctacaac
3361 gcagaaaaat atttgccc atcattggcc gccgtagtgg ggcagacttg gcgcaacttg



FIG.2B-6

3421 gatatatttga ttgtcgaatga cggctcgacg gacggcacgc ccgccattgc ccggcatttc
3481 caagaacagg acggcaggat caggataatt tccaatcccc gcaattttggg ctttatcgcc
3541 tctttaaaca tcgggctgga cgaattggca aagtcggggg ggggggaata tattgcgcgc
3601 accgatgccg acgatatatgc ctccccggc tggattgaga aaatcgtggg cgagatggaa
3661 aaagaccgca gcatcatatgc gatgggcgcg tggttggaag ttttgtcggg agaaaaaat
3721 aaaagcgtgc ttgccgccat tgcccgaac ggcgaattt gggacaacc gaccggcat
3781 gaagacattg tcgccgtttt cccttcggc aaccatcac acaacaacac gatgattatg
3841 aggcgcagcg tcattgacgg cggtttgcgg ttcgatccag cctatatcca cgccgaagac
3901 tataagtatt ggtacgaagc cggcaaatg ggcaggctgg cttattatcc cgaagccttg
3961 gtcaaatacc gcttccatca agaccagact tcttccaat acaacctgca acagcgagg
4021 acggcgtgga aaatcaaga agaatcagg gcgggggtatt ggaaggcggc aggcatagcc
4081 gtcggggcgg actgcctgaa ttacgggctt ttgaaatcaa cgccatatgc gttgtacgaa
4141 aaagccttgt ccggacagga tatcggatgc ctccgcctgt tcctgtacga atatttcttg
4201 tcgttgaaaa agtattcttt gaccgatttg ctggatttct tgacagaccg cgtgatgagg
4261 aagctgtttg ccgcaccgca atataggaaa atcctgaaaa aaatgttacg cccttgga
4321 taccgcagct attgaaaccg aacaggataa atcatgcaaa accacgttat cagcttggct
4381 tccgccgcag agcgcaggcg gcacattgcc gataccttcg gcagtcggcg catcccgctc
4441 cagtttttcg acgcactgat gccgtctgaa aggcctggaa aggcgatggc ggaactcgtc
4501 cccggcttgt cggcgacccc ctatttgagc ggagtggaaa aagcctgctt tatgagccac
4561 gccgtattgt gggaacaggc gttggatgaa ggtctgccgt atatcgccgt atttgaggac
4621 gacgtttttac tcggcgaaag aggttcgcg ctttatcgtc cgttttgaaa cgatgtttgc gaaagtatt
4681 cgttttgaca aggatccgc ctttatcgtc cgttttgaaa aaccggtcat ttcctttgct ggagagcgaa
4741 gtcagaccgg ataaagtcct gaattatgaa aaccggtcat ttcctttgct ggagagcgaa
4801 catgtgggga cggctggcta tatcatttcg cgtgaggcga tgcggttttt cttggacagg
4861 tttgccgttt tgccgccaga gcggtatgaa gcggtagatt tgatgatgtt tacttatttc
4921 tttgataaag aggggatgcc tgtttatcag gttagtcccc ccttatgtac ccaagaattg
4981 cattatgcca agtttctcag tcaaaacagt atgttgggta gcgatttggg aaaagatagg
5041 gaacaaggaa gaagacaccg ccgttcgttg aaggtgatgt ttgacttgaa gcgtgctttg
5101 ggtaaatcgc gtagggaaaa gaagaaagaa atggagcgtc aaaggcaggc ggagccttgag
5161 aaagtattac gcaggcgggt catattgttc aaatagtttg tgtaaatat aggggatata

FIG.2B-7

5221 aatcagaaat ggacacactg tcattcccg gcagggcggga atctagggtct ttaacttcg
5281 gttttttccg ataaattctt gccgcattaa aattccagat tccgccttcc gcgggatga
5341 cggcgggggg attgttgctt ttccggataa aatcccgtgt tttttcatct gctaggtaaa
5401 atcgcccaaa agcgtctgca tcgcggcgat ggcggcgagt gggcggttt ctgtgcgtaa
5461 aatccgtttt ccgagtgtaa ccgcctgaaa gccggcttca aatgcctgtt gttcttcctg
5521 ttctgtccag ccgccttcgg gccgcacct aaagacgatt gcgccggacg ggtggcggat
5581 gtcgccgagt ttgcaggcgc ggttgatgct cataatcagc ttggtgtttt cagacggcat
5641 ttgtcgagt gcttcacggg agccgatgat gggcagtagc gggggaacgg tgttcctgcc
5701 gctttgttcg caccggaga tgacgatctc ctgccagct gcgagcgtt tggcggcgcg
5761 ttctccgtcg aggcggacga tgcagcgttc gctgatgacg ggctgtatgg cggttacgcc
5821 gagttcgacg cttttttgca gggtgaaatc catgcgac